

LEAKING UNDERGROUND STORAGE TANK  
QUALITY CONTROL/QUALITY ASSURANCE PLAN

---

Iowa Department of Natural Resources  
Environmental Protection Division  
Air Quality and Solid Waste Protection Bureau  
Underground Storage Tank Section

Project Officer's Name: \_\_\_\_\_

Project Officer's Signature: \_\_\_\_\_

Project QC/QA Officer's Name: \_\_\_\_\_

Project QC/QA Officer's Signature: \_\_\_\_\_

Iowa Department of Natural Resources  
Wallace State Office Building  
900 East Grand  
Des Moines, IA 50319-0034  
515/281-8693

February 28, 1992

## LIST OF CONTENTS

<u>TOPIC</u>	<u>PAGE</u>
I. Objective and Scope	4
II. Data Usage	4
III. Sampling Design and Rationale	4
A. Planning	4
B. Avoiding Sample Contamination and Deterioration	5
C. Protecting the Integrity of the Sample	5
D. Duplicate Sampling	5
IV. Sample Preservation	10
V. Container and Sampler Cleaning Procedures	12
VI. Sample Collection and Handling	12
VII. Chain of Custody Record	14
VIII. Sample Analysis Request Sheet	14
IX. Sample Delivery	15
X. Sample Seal	15
XI. Shipping of Samples	15
XII. Field Log Book	16
XIII. Monitoring Parameters and Frequency of Collection	16
XIV. Parameter Table	17
XV. Project Organization and Responsibility	17
XVI. Accuracy and Precision Requirements	18
XVII. Data Representativeness	18
XVIII. Data Comparability	18
XIX. Data Completeness	18
XX. Sampling Procedures	19
XXI. Sampling Custody Procedures	19
XXII. Calibration Procedures and Preventive Maintenance	19

# LIST OF CONTENTS CONTINUED

<u>TOPIC</u>	<u>PAGE</u>
XXIII. Documentation, Data Reduction and Reporting	19

## LIST OF TABLES

<u>TABLE NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
1	Checklist of Items Useful in the Field Sampling of Leaking UST Systems	6
2	Sampling Points Recommended for Most UST Systems	8
3	Recommended Sample Containers and Closures	9
4	Number of Samples to be Collected	9
5	Recommendation for Sampling and Preservation According to Measurement	11
6	Parameter Table	17
7	Analytical Method Accuracy and Precision Requirements	18

## LIST OF APPENDICES

<u>APPENDIX NUMBER</u>	<u>TITLE</u>	<u>PAGE</u>
1	Chain of Custody Records	20
2	Sample Analysis Request Sheet	21

## I. OBJECTIVE AND SCOPE

This plan was written to provide guidance in the collection, preservation, transportation, and chain of custody procedures during the investigation and corrective action phases of suspected and actual releases from underground petroleum storage tanks.

## II. DATA USAGE

Data collected as well as laboratory analysis of samples of soil and water will be evaluated for determinations regarding contamination/non-contamination of soils and groundwater, establishing vertical and horizontal extent of contamination, need and status for corrective action, to support cost recovery litigation, for supplying alternative water supplies, to attempt to persuade responsible parties to undertake corrective action, and to support use of LUST Trust Fund monies for cleanup activities.

## III. SAMPLING DESIGN AND RATIONALE

As previously mentioned, sampling is done during investigations to document a release/no-release situation or in corrective action implementation situations. Personnel from both UST and LUST programs as well as contractors may be responsible for sampling in the course of the project.

Effective program performance depends on access to reliable scientific evidence of the environmental effects of leaking UST systems. There will be even more need for sampling and testing in those cases where the history of the site is not completely documented. The analytical procedures can yield results which are only as reliable as the manner of sampling from the site, and great care must be taken in collecting and caring for such samples between the field and the laboratory. In all sampling procedures it is important to:

Plan the sampling procedure before initiating it.

Avoid contamination and deterioration of the samples during collection, storage, and transportation.

Protect the integrity of the samples both technically and legally so as to assure their being truly representative of the actual site conditions.

### A. PLANNING

The following steps are essential in the plan of action:

- 1 . Determine the waste to be sampled.
- 2 . Determine the reason for sampling.
- 3 . Research background information about the waste.

- 4 . Research the location of the sampling site. Refer to appropriate maps and/or diagrams. Contact responsible personnel.
- 5 . Select the proper sampling point(s). (See Table 2).
- 6 . Select the proper sample container and closure. (See Table 3)
- 7 . Determine the appropriate number of samples and volumes to be taken. (See Table 4)
- 8 . Determine the action level for each contaminant parameter to be analyzed.
- 9 . Determine the necessary sampling apparatus. (See Table 1)
10. Determine sampling precautions and select necessary protective devices and protective clothing. (See Site Safety Plan)

#### B. AVOIDING SAMPLE CONTAMINATION AND DETERIORATION

- 1 . All sampling apparatus must be cleaned and decontaminated before and after each use.
- 2 . Store clean samplers in a clean, protected manner.
- 3 . It is critical that sampling containers and their caps be clean.
- 4 . Proper containers, compatible with the media sampled, must be selected.
- 5 . Refrigerate or preserve the sample as specified in Table 5.
- 6 . Analyze the samples as rapidly as possible.

#### C. PROTECTING THE INTEGRITY OF THE SAMPLE

- 1 . Sample must be labeled and sealed properly immediately after collection.
- 2 . Record all pertinent information in the field log book.
- 3 . Establish chain of custody record.
- 4 . Deliver sample to laboratory custodian as soon as possible.

#### D. DUPLICATE SAMPLING

- 1 . Duplicate samples will be collected for at least 10% of all samples taken. These will be submitted to the laboratory as a blind sample and logged in as a separate, individual sample.
- 2 . Field and trip blank samples will be incorporated into the total sampling plan in cooperation and through coordination with the University of Iowa Hygienic Laboratory QA/QC plan.

TABLE 1

CHECKLIST OF ITEMS USEFUL IN THE FIELD SAMPLING OF LEAKING  
UST SYSTEMS

<u>Quantity</u>	<u>Item</u>	<u>Use</u>
1	Soil sampler, auger	To sample contaminated soil, dried ponds, etc.
1	Grain sampler	To sample powdered or granular material.
1	Scoop, stainless steel blade	To sample top soil or shallow layers of solid wastes.
1	Veihmeyer soil sampler	To collect soil core samples.
1	Trier, single slot	To sample granular and powdered material in piles, sacks, fiber-drums, etc.
1	Waste pile sampler	To sample soil piles.
6	1000-2000 ml (1-qt, 2-qt) linear polyethylene, wide mouth glass jars.	To contain solid and larger volume liquid samples for semi-volatile or non-volatile products (diesel, fuel, fuel oil, etc.)
18	40 ml glass vials	For collection (triplicate of soil or water samples for volatile products (gasoline)).
1	Coverall, long-sleeved, cotton	Protective garment.
1	Suit, neoprene rubber, sararex, Tyvek, longsleeved.	Protective garment.
1 pair	Gloves, neoprene rubber, Tyvek	Protective garment.
1	Respirator, chemical cartridge type	For use in atmospheres not immediately dangerous to life.
4	Cartridges for respirator	For use in atmospheres not immediately dangerous to life.
1 pair	Goggles	Eye protection.
1	Portable eyewash	For emergency eyewash.
1	Fire extinguisher	Fire suppression.

TABLE 1 (continued)

CHECKLIST OF ITEMS USEFUL IN THE FIELD SAMPLING OF LEAKING  
UST SYSTEMS

<u>Quantity</u>	<u>Item</u>	<u>Use</u>
1	Hard hat	Head protection.
1	18.9-liter (5-gal) water in cubitainer or equivalent with spigot	For miscellaneous washing purposes.
6	Teflon liners for Bakelite caps	To provide inert cap liners.
18	Teflon-lined septum caps	For 40 ml glass vials for volatile products.
12 each	Sample labels, seals, sample analysis request sheets, chain of custody records	To document sample.
1	Field log book	To keep sample records.
1	Weighted bottom sampler	To sample storage tanks or similar containers.
1	Disposable towels or rags	To clean sampling equipment.
6	Large polyethylene bags	To store waste papers, rags, etc.
12	Polyethylene bags	To store sample containers.
4	Waterproof pens and labels	To complete records.
1	Detergent, solution (i.e. Liquinox or Alconox), methanol	To clean samplers.
1	Apron, oil and acid proof	Protective garment.
1	Face mask	Protective garment.
1	18.9 liter (5-gal) can	To store used cleaning solvent.

TABLE 1 (continued)

CHECKLIST OF ITEMS USEFUL IN THE FIELD SAMPLING OF LEAKING  
UST SYSTEMS

1	Oxygen indicator	Determine percentage of oxygen in atmosphere.
1	Combustible gas indicator	Determine presence of combustible gases.
1	HNU photoionizer	Measure concentrations of photoionizing gases.

TABLE 2

SAMPLING POINTS RECOMMENDED FOR MOST UST SYSTEMS

<u>Media</u>	<u>Sampling point</u>
Residue in storage tank	Sample from the top through the sampling hole.
Soil	Divide the surface area into an imaginary grid. <sup>a</sup> Sample each grid.
Soil borings	Project specific.
Wells	Project specific

<sup>a</sup> The number of grid points is determined by the desired number of samples to be collected. Grid size will be determined on a case-by-case basis.

TABLE 3

## SAMPLE CONTAINERS AND CLOSURES RECOMMENDED

<u>Media</u>	<u>Recommended Container</u>	<u>Recommended Closure</u>
Oil wastes	1000 and 2000 ml (1-qt. and 1/2-gal) wide mouth glass jars. For lab identification (typing) of free product, 40 ml glass vials may be used.	Teflon-lined caps.
Soil/Soil borings	Glass jars, 1000 ml (1-qt.) wide mouth for heavy product. For volatile product, 40 ml glass vials.	Teflon, Teflon-lined caps.
Water	Glass vial, 40 ml. Glass jars, 1,000 ml (1-qt.), wide mouth (for diesel contaminated water).	Teflon, Teflon-faced septa caps.

TABLE 4

## NUMBER OF SAMPLES TO BE COLLECTED

<u>Case No.</u>	<u>Information Desired</u>	<u>Waste Type</u>	<u>Number Of Samples To Be Collected</u>
1	Concentration range	Liquid	3 to 20 separate samples from different sampling points and depths.
2	Concentration range	Soil	3 to 20 separate samples from different sampling areas.
3	Average concentration for legal evidence	All types	3 identical samples.

#### IV. SAMPLE PRESERVATION

Complete and unequivocal preservation of samples is a practical impossibility. Regardless of the nature of the sample, complete stability for every constituent can never be achieved. At best, preservation techniques can only retard the chemical and biological changes that inevitably continue after the sample is removed from the parent source. The changes that take place in a sample are either chemical or biological. In the former case, certain changes occur in the chemical structure of the constituents that are a function of physical conditions. Metal cations may precipitate as hydroxides or form complexes with other constituents; cations or anions may change valence states under certain reducing or oxidizing conditions; other constituents may dissolve or volatilize with the passage of time. Metal cations, such as iron and lead, may also absorb onto surfaces (glass, plastic, quartz, etc.). Biological changes taking place in a sample may change the valence of an element or a radical to a different valence. Soluble constituents may be converted to organically bound materials in cell structures, or cell lysis may result in release of cellular material into solution. The well known nitrogen and phosphorus cycles are examples of biological influence of sample composition. Therefore, as a general rule, it is best to analyze the samples as soon as possible after collection. This is especially true when the analyzed concentrations are expected to be in the low ug/l range.

Methods of preservation are relatively limited and are intended generally to (1) retard biological action, (2) retard hydrolysis of chemical compounds and complexes, (3) reduce volatilization of constituents, and (4) reduce adsorption effects. Preservation methods are generally limited to pH control, chemical addition, refrigeration, and freezing.

The recommended preservation for various constituents is given in Table 5. These choices are based on the accompanying references and on information supplied by various Quality Assurance Coordinators. As more data become available, these recommended holding times will be adjusted to reflect new information. Other information provided in the table are an estimation of the volume of sample required for the analysis, the suggested type of container, and the maximum recommended holding times for samples properly preserved.

TABLE 5

RECOMMENDATION FOR SAMPLING AND PRESERVATION  
OF SAMPLES ACCORDING TO MEASUREMENT

Volatile Organic Compounds:

<u>Substance</u>	<u>Volume Required (ml)</u>	<u>Container<sup>(1)</sup></u>	<u>Preservation</u>	<u>Holding Time</u>
Soil/Sludge	1,000	G. Teflon	Cool, 4°C	14 days
Water	40	G. Teflon-septum	Cool, 4°C	7 days
Water	40	G. Teflon-septum	4 drops concentrated HCL, Cool 4°C	14 days

Low Volatile Organic Compounds:

<u>Substance</u>	<u>Volume Required (ml)</u>	<u>Container<sup>(1)</sup></u>	<u>Preservation</u>	<u>Holding Time</u>
Soil/Sludge	1,000	G. Teflon	Cool, 4°C	14 days
Water	1,000	G. Teflon-septum	Cool, 4°C	14 days

1. Glass (G). For metals, polyethylene with a polypropylene cap (no liner) is preferred. Samples collected for metals must be acid preserved.

It should be pointed out that holding times listed above are recommended for properly preserved samples based on currently available data. It is recognized that for some sample types, extension of these times may be possible while for other types, these times may be too long. Where shipping regulations prevent the use of the proper preservation technique or the holding time is exceeded, the final reported data for these samples should indicate the specific variance.

## V. CONTAINER AND SAMPLER CLEANING PROCEDURES

Immediately after use, remove surface residuals from all containers and samplers. They should then be washed with a detergent solution (i.e. Liquinox or Alconox), rinsed several times with warm tap water, rinsed with distilled water, drained of excess water, and air-dried or dried with a stream of warm, dry air.

Items that have been exposed to petroleum products should be wiped with an absorbent cloth, rinsed with an organic solvent such as methanol and washed as above.

## VI. SAMPLE COLLECTION AND HANDLING

When collecting samples, liquids and solids should be introduced into the vials gently to reduce agitation which might drive off volatile compounds. Liquid samples should be poured into the vial without introducing any air bubbles within the vial as it is being filled. Should bubbling occur as a result of violent pouring, the sample must be poured out and the vial refilled. Each vial should be filled until there is a meniscus over the lip of the vial. When using a screw-top lid with a septum, the Teflon side should face toward the vial. After tightening the lid, the vial should be inverted and tapped to check for air bubbles. If there are any air bubbles present the sample must be retaken. Two vials should be filled per sample location.

For acid-preserved samples, four drops of concentrated HCL acid should be added to the empty vial prior to introducing the liquid sample.

Vials for samples with solid or semi-solid (sludges) materials should be completely filled as best as possible. The vials should be tapped slightly as they are filled to try and eliminate as much free air space as possible. Two vials should also be filled per sample location.

Vials should be filled and labeled immediately at the point at which the sample is collected. They should not be filled near a running motor or any type of exhaust system because discharged fumes and vapors may contaminate the samples. The two vials from each sampling location should then be sealed in separate plastic bags to prevent cross-contamination between samples, particularly if the sampled waste is suspected of containing high levels of volatile organics. (Activated carbon may also be included in the bags to prevent cross-contamination from highly contaminated samples). Samples may also be contaminated by diffusion of volatile organics through the septum during shipment and storage. To monitor possible contamination, a trip blank prepared from distilled deionized water should be carried throughout the sampling, storage, and shipping process.

After the sample is transferred into the proper sample container, the container must be tightly capped as quickly as possible. The sample should be refrigerated in the proper manner, as specified in Table 1.

### Sample Label (Tag)

The sample must be labeled properly immediately after collection. An example of an official sample label is shown below. The label must include at least the following information:

Name of collector.

Date and time of collection.

Place of collection.

Collector's sample number, which uniquely identifies the sample.

### OFFICIAL SAMPLE LABEL (TAG)

Location: \_\_\_\_\_

Date: \_\_\_\_/\_\_\_\_/\_\_\_\_ Time: \_\_\_\_\_

Type of Analysis: \_\_\_\_\_

Physical Characteristics: \_\_\_\_\_

Field Information: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Lab #: \_\_\_\_\_ Collector: \_\_\_\_\_

## VII. CHAIN OF CUSTODY RECORD

The Chain of Custody Record is a written record established in order to trace sample possession from the moment of collection through its introduction into evidence.

To establish the documentation necessary to trace sample possession from the time of collection, a Chain of Custody Record must be filled out and accompany every sample. The record must contain the following minimum information:

- Collector's sample number.
- Signature of collector.
- Date and time of collection.
- Place and address of collection.
- Waste type.
- Signatures of persons involved in the chain of possession.
- Inclusive dates of collection.

A sample is in custody if it is in any one of the following states:

- In actual physical possession.
- In view after being in physical possession.
- In physical possession and locked so that no one can tamper with it.
- In a secured area, restricted to authorized personnel.

An example of the Chain of Custody Record is illustrated in Appendix 1.

## VIII. SAMPLE ANALYSIS REQUEST SHEET

The Sample Analysis Request Sheet is intended to accompany the sample on delivery to the laboratory. The field portion of this form must be completed by the person collecting the sample and should include most of the pertinent information noted in the log book. The action standards or required detection limits for the contaminants being analyzed should be included with the analysis requested. An example of the Sample Analysis Request Sheet is illustrated in Appendix 2.

The laboratory portion of this form is intended to be completed by laboratory personnel and includes the following:

- Name of person receiving the sample.
- Laboratory sample number.
- Date of sample receipt.
- Analysis to be performed.

The Chain of Custody Record as shown in Appendix 1 is also used as the Hazardous Materials Sample Analysis Request Sheet.

#### IX. SAMPLE DELIVERY

The sample should be delivered to the laboratory by the field sampler, in person whenever possible. The sample must be delivered to the laboratory as soon as possible, usually the same day as sampling.

See Table 5 for sample preservation.

The sample must be accompanied by the Chain of Custody Record and by a Sample Analysis Request Sheet. The sample must be delivered to the person in the laboratory authorized to receive the sample (often referred to as the sample custodian).

#### X. SAMPLE SEAL

A sample seal should be placed on the sample container to preserve the integrity of the sample from the time it is collected until it is opened in the laboratory.

This seal must be attached in such a way that it is necessary to break it in order to open the sample container.

#### XI. SHIPPING OF SAMPLES

When a sample is shipped to the laboratory, it must be packaged in a proper shipping container to avoid leakage, or breakage. A cardboard box which will provide at least 10 cm (4 inches) of tight packing around the sample container is recommended for use. Acceptable materials include sawdust, crumbled newspapers, vermiculite, polyurethane chips, etc. Other samples that require refrigeration must be packed with reusable plastic packs or cans of frozen gels in molded polyurethane boxes, with a sturdy fiberboard protective case. The boxes must be taped closed with masking tape or fiber plastic tape.

All packages must be accompanied by a Sample Analysis Request Sheet, and Chain of Custody Record. Complete address of the sender and the receiving laboratory must legibly appear on each package. When sent by mail, register the package with return receipt requested. When sent by common carrier, obtain a copy of the Bill of Lading. Post office receipts and Bill of Lading copies may be used as part of the Chain of Custody documentation.

## XII. FIELD LOG BOOK

All information pertinent to a field survey and/or sampling must be recorded in a log book. This must be a bound book, preferably with consecutively numbered pages that are 8 1/2 x 11". Entries in the log book must be in indelible ink and include at least the following:

- Purpose of sampling (e.g., surveillance, etc.).
- Location of sampling (e.g., hauler, disposal site, etc., and address).
- Name and address of field contact.
- Owner's name and address.
- Type of process (if known) producing need for sampling.
- Type of sample (e.g., soil, water, etc.).
- Declared component (e.g., oil, gasoline, etc.).
- Number and volume of sample taken.
- Description of sampling taken.
- Date and time of collection.
- Collector's sample identification number(s).
- Sample distribution (e.g., laboratory, hauler, etc.).
- References such as maps or photographs of the sampling site.
- Field observations.
- Any field measurements made (such as pH, flammability, explosivity, etc.).

Sampling situations vary widely. No general rule can be given as to the extent of information that must be entered in the log book. A good rule, however, is to record sufficient information so that someone can reconstruct the entire sampling situation from the field log, without reliance on the collector's memory.

The log book must be protected and kept in a safe place. Any corrections to entries should be struck through with a single line, initialed and dated.

## XIII. MONITORING PARAMETERS AND FREQUENCY OF COLLECTION

Current indication parameters for petroleum in both corrective action and contamination/non-contamination situations related to soil are total petroleum hydrocarbons and for water are benzene, ethylbenzene, toluene, and xylene. Sample collection frequency for contamination or non-contamination investigations is determined at the time of the investigation. Corrective action sampling frequency will be a minimum of monthly. Other parameters may be required depending on site specific or future needs. Current action standard must be indicated.

#### XIV. PARAMETER TABLE

The following table describes analytical methodology requirements for samples collected at UST sites. Analytical methods OA-1, "Method for Determination of Volatile Petroleum Hydrocarbons" revision July 1, 1991 and method OA-2 "Extractable Petroleum Products (and related low volatility organic compounds)" revision July 1, 1991 shall be utilized.

TABLE 6  
PARAMETER TABLE

<u>PARAMETER</u>	<u>NUMBER OF SAMPLES</u>	<u>SAMPLE MATRIX</u>	<u>ANALYTICAL METHOD REFERENCE</u>	<u>SAMPLE PRESERVATION</u>	<u>HOLDING TIME</u>
Total Extractable Hydrocarbons	as needed	soil	OA-2	Cool to 4°C	14 days
Total Hydrocarbons	as needed	soil	OA-1	Cool to 4°C	14 days
Benzene	as needed	water	OA-1	Cool to 4°C	7 days*
Ethylbenzene	as needed	water	OA-1	Cool to 4°C	7 days*
Toluene	as needed	water	OA-1	Cool to 4°C	7 days*
Xylene	as needed	water	OA-1	Cool to 4°C	7 days*

\* 14 days if acid-preserved.

#### XV. PROJECT ORGANIZATION AND RESPONSIBILITY

The following is a list of key projects personnel and their corresponding responsibilities:

##### PROJECT PERSONNEL

##### RESPONSIBILITY

Specific Project Manager  
Specific Project Manager  
Dr. George Breuer - U of I Hygienic Lab  
Carol Segar - U of I Hygienic Lab  
Bill Berger - U of I

Sampling Operations  
Sampling QC  
Laboratory Analysis  
Laboratory QC  
Data Processing  
Activities  
Data Processing QC  
Data Quality Review  
Performance Auditing

Bill Berger - U of I  
Pam Kostle - U of I  
Pete Hamlin - Bureau Chief  
Air Quality and Solid Waste  
Pete Hamlin - Bureau Chief  
Pete Hamlin - Bureau Chief  
Keith Bridson - Supervisor  
LUST Program

Systems Auditing  
Overall QA  
Overall Project  
Coordination

## XVI. ACCURACY AND PRECISION REQUIREMENTS

The following table describes analytical accuracy and precision requirements for soil and groundwater samples collected at UST sites.

TABLE 7  
ANALYTICAL METHODOLOGY PRECISION REQUIREMENTS

<u>Analyte</u>	<u>Accuracy (% Recovery)</u>	<u>Precision (% Difference)</u>	<u>Limit* (Water/Soil)</u>
Gasoline (volatile hydrocarbons)	89	5	20 ppb/100 ppb
Benzene	99	2	1 ppb/5 ppb
Toluene	94	3	1 ppb/5 ppb
Xylenes	93	3	1 ppb/5 ppb
Total Extractable hydrocarbons	63/92	4.9	100 ppb/3.0 ppm

\* Assumes clean matrix

## XVII. DATA REPRESENTATIVENESS

Representativeness is a quality characteristic considered a goal to be achieved rather than a characteristic which can be measured quantitatively. Analytical results from collected samples are to demonstrate contamination and if so, at what concentration.

## XVIII. DATE COMPARABILITY

The data shall be reported in a manner which allows one data set to be compared quickly and easily to another. All data shall be reported for water as ug/l, mg/l, or for soil as ug/kg or mg/kg.

## XIX. DATA COMPLETENESS

One hundred per cent of data completeness is desired for all sampling requests. If less than 100% is received, the project officer will decide if the data obtained is valid and sufficient for the intended purpose. If not, additional sampling will be required.

## XX. SAMPLING PROCEDURES

Refer to Section III.

## XXI. SAMPLING CUSTODY PROCEDURES

Refer to Section III.

## XXII. CALIBRATION PROCEDURES AND PREVENTIVE MAINTENANCE

---

University of Iowa Hygienic Laboratory method OA-1, "Method for Determination of Volatile Petroleum Hydrocarbons" revision July 1, 1991 and method OA-2 "Extractable Petroleum Products (and related low volatility organic compounds)" revision July 1, 1991 shall be utilized.

## XXIII. DOCUMENTATION, DATA REDUCTION AND REPORTING

University of Iowa Hygienic Laboratory method OA-1, "Method for Determination of Volatile Petroleum Hydrocarbons" revision July 1, 1991 and method OA-2 "Extractable Petroleum Products (and related low volatility organic compounds)" revision July 1, 1991 shall be utilized.

[illegible]

Appendix 2  
Chain of Custody Record  
Sample Analysis Request

**Part I: FOR COMPLETION BY FIELD PERSONNEL**

Name of Sampler: \_\_\_\_\_ Date Sampled: \_\_\_\_\_ Time: \_\_\_\_\_ a.m.  
p.m.

Source: \_\_\_\_\_  
(name of company, disposal site, etc.)

Location of sampling: \_\_\_\_\_  
(street address, section, twp., range, etc.)

Company contact: \_\_\_\_\_ Telephone: (    ) \_\_\_\_\_

Address: \_\_\_\_\_  
(number, street, city, state, zip code)

Analysis requested: \_\_\_\_\_  
\_\_\_\_\_

Special handling and/or storage instructions: \_\_\_\_\_  
\_\_\_\_\_

**PART II: FOR COMPLETION BY FIELD AND LABORATORY PERSONNEL**

Total number of containers : \_\_\_\_\_

<u>Collector's*</u> <u>Sample No.</u>	<u>Laboratory</u> <u>Log No.</u>	<u>Type of Sample*</u> <u>(soil, water, etc.)</u>	<u>Collector's*</u> <u>Sample No.</u>	<u>Laboratory</u> <u>Log No.</u>	<u>Type of Sample*</u> <u>(soil, water, etc.)</u>
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____

Comments on sample characteristics: \_\_\_\_\_  
\_\_\_\_\_

**SAMPLE TRANSFER REGISTER**

<u>Date/Time</u>	<u>From (name)</u>	<u>To (name)</u>	<u>Witness</u>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Laboratory storage area: \_\_\_\_\_  
\_\_\_\_\_

\* for completion by field personnel

Routine disposal \_\_\_\_\_ Hold for disposal approval \_\_\_\_\_

\_\_\_\_\_  
(signature)

